User’s manual

Hydra

R5976260, Current version

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chapter 4	corr.	
chapter 5	corr.	
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chapter 7		
chapter 8		

new: The corresponding chapters are new or completely revised.
corr.: Passages of the corresponding chapter were corrected; see modification bars.
add.: Passages of the corresponding chapter were added; see modification bars.

This manual refers to following hardware components of HYDRA:

Hydra unit	R9830966 – Hydra Base 800W

Document history

Modifications, which result in a new version, are indicated by a vertical bar.

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The environmental conditions as well as the servicing and maintenance regulations specified in this manual must be complied with by the customer.

Revision sheet

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Please correct the following points in this documentation (**R5976260**):

page	wrong	correct

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1 Introduction

This chapter explains the structure of the manual itself and the used typographic styles and symbols. Safety information is provided concerning the operation of computer systems from Barco.

1.1 How this manual is organized

This manual describes the design of HYDRA from Barco. It is divided into eight chapters:

- **Introduction**
  explains the structure of the manual itself and the used typographic styles and symbols. Safety information is provided concerning the operation of computer systems from Barco.
- **Summary**
  gives an overview about the features of HYDRA.
- **Getting Started**
  describes the set up of HYDRA. If your HYDRA is already configured within your working place you can skip this chapter and continue with chapter 4 Operating.
- **Operating**
  provides information about extended configurations, functionality and access to the settings of the HYDRA.
- **Maintenance**
  describes maintenance operations for HYDRA.
- **Technical Appendix**
  gives tabular overview about the technical details of HYDRA, its components and of their interfaces.
- **Troubleshooting**
  gives advice, if your HYDRA does not operate properly.
- **Index**
  gives an overview about the used tables and figures.

Chapters, pages, figures and tables are numbered separately. Chapters are indicated by a »point syntax«, e. g. **4.2.3**, pages by a »dash syntax«, e. g. **2-1**, as figures and tables are, e. g. **figure 5-4**.

1.2 Styles and symbols

The typographic styles and the symbols used in this document have the following meaning:

Bold	Labels, menus and buttons are printed in the **Bold** font.
Condensed	Links to both other chapters of this manual and to sites in the Internet are printed condensed. In the on-line version of this manual all hyperlinks appear teal.
`Courier`	Names of files and parts from programs are printed in the `Courier` font.
`Courier bold`	Inputs you are supposed to do from the keyboard are printed in **`Courier bold`** font.

↳	**Within a piece of programming code this arrow marks a line, that must be made up in two lines, though meant to be one line.**
	If you do not heed instructions indicated by this symbol there is a risk of damage to the equipment!
	If you do not heed instructions indicated by this symbol there is a risk of electrical shock and danger to personal health!
	If you do not heed instructions indicated by this symbol there is a risk of damage to parts, which are sensitive towared electrostatic charge!
	If you do not heed instructions indicated by this symbol there is a risk to get harmed by sharp objects!
	If you do not heed instructions indicated by this symbol there is a risk that parts may explode!
	If you do not heed instructions indicated by this symbol there is a risk that hot parts impact persons or objects!
	The sheet icon indicates additional notes.
	Next to this icon you find further information.
	This icon marks tips.
	Next to this icon you find important notes.

1.3 Safety instructions

This section describes safety precautions, which must be observed when installing and operating a product from Barco.

1.3.1 Standards

Safety regulations

HYDRA is built in accordance with the requirements of the international safety standard IEC-60950-1, UL 60950-1 and CSA C22.2 No. 60950-1-03, which are the safety standards of information technology equipment including electrical business equipment.

These safety standards impose important requirements on the use of safety critical components, materials and isolation, in order to protect the user or operator against the risk of electric shock and energy hazard, and having access to live parts.

Safety standards also impose requirements to the internal and external temperature variations, radiation levels, mechanical stability and strength, enclosure construction and protection against risk of fire.

Simulated single fault condition testing ensures the safety of the equipment to the user even when the equipment's normal operation fails.

Electromagnetic interference

Electromagnetic emission of HYDRA complies with EN55022, EN61000-3-2, EN61000-3-3 and the limits for a class A digital device, pursuant to Part 15 of the FCC Rules.

Electromagnetic immunity of HYDRA complies with EN55024.

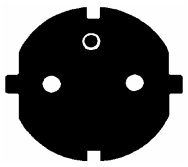
1.3.2 Precautions

For your own protection, observe the following safety precautions when installing, operating and servicing your device:

- Before operating the units please read this manual thoroughly and retain it for future reference!
- Observe all warnings and instructions printed on the devices!
- Servicing not explicitly mentioned in this manual should never be carried out by unauthorized personnel! Never open the case of the unit without first disconnecting both power supply cords!
- The appliance couplers on this unit must be used for disconnecting the unit from the mains circuit. For removal of all power from the unit, always disconnect both supply cords.
- To prevent fire or electrical shock hazard, do not expose this unit to rain or moisture!
- This product should be operated from an AC power source!
- Check that the voltage and frequency of your power supply match those printed on the device label with the rated electrical values!
- If you are not sure of the type of AC power available, consult your dealer or local power company!
- This product is equipped with a 3-wire grounding plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug!
- This equipment must be grounded (earthed) via the supplied 3 conductor AC power cables. (If the supplied power cables are not the correct one, consult your dealer.)

Mains lead (AC Power cords) with CEE 7 plug:

The wires of the mains lead are colored in accordance with the following code:



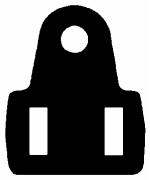
yellow + green	**Earth (Ground)**
blue	**Neutral**
brown	**Line (Live)**

Figure 1-1
CEE 7 plug

Power cord with NEMA 5-15 plug:

- The cord set must be UL-approved and CSA-certified.
- The minimum specification for the flexible cord is No. 18 AWG, Type SVT or SJT, 3-conductor.
- The cord set must have a rated current capacity of at least 10A.
- The attachment plug must be an Earth-grounding type with a NEMA 5-15P (10A, 125V) configuration.

The wires of the power cords are colored in accordance with the following code.



green or yellow + green	**Earth (Ground)**
blue or white	**Neutral**
brown or black	**Line (Live)**

Figure 1-2
NEMA 5-15 plug

- Do not allow anything to rest on the power cords. Do not locate this product where people will walk on the cords. To disconnect the cords, pull them out by the plug. Never pull the cords themself.
- If an extension cord is used with this product, make sure that the total of the ampere ratings on the products plugged into the extension cord does not exceed the extension cord ampere rating.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock.
- Never spill liquid of any kind on the product. Should any liquid or solid object fall into the cabinet, unplug the set and have it checked by qualified service personnel before resuming operations.
- Lightning – For extra protection for this video product during a lightning storm or when it is lift unattended and unused for a long period of time, unplug it from the wall outlet. This will prevent damage to the unit due to lightning and AC power-line surges.

1.3.3 Unpacking of devices

Note advises on the packaging for unpacking!

1.3.4 Installation

- Do not place this unit on an unstable cart, stand, or table. The unit may fall, causing serious damage to it.
- Do not use this unit near water.
- Use only the power cord supplied with your unit. While appearing to be similar, other power cords have not been safety tested at the factory and may not be used to power the unit. For a replacement power cord, contact your dealer.
- Slots and openings in the cabinet and the sides are provided for ventilation; to ensure reliable operation of the unit and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This unit should not be placed in a built-in installation or enclosure unless proper ventilation is provided.
- The maximum recommended ambient temperature for this equipment is 40° C.
- When using the unit in a multi-unit rack assembly or closed assembly the ambient temperature inside the assembly may not succeed the maximum rated ambient temperature. We advice to keep a distance of one U between a HYDRA and another device in the rack for reasons of cooling.
- When installed in a rack, the installation should be such that the amount of air flow required for safe operation of the equipment is not compromised. The mounting of the equipment should be such that no hazardous condition is achieved due to uneven mechanical loading. Reliable earthing of the equipment mounted in the rack should be maintained through the power distribution in the rack. Observe that the total of the ampere ratings on the rating plates of the equipment in the rack does not overload the supply wiring of the rack.

1.3.5 Servicing

Mechanical or electrical modifications others than described in this manual must not be made to the devices. Barco is not liable for damages resulting from modified devices.

Only authorized personnel should carry out other maintenance work not explicitly mentioned in this installation manual!

Never open the case of HYDRA without first disconnecting the power supply cords! Measurements and tests with the opened device may be carried out only in the factory or by specially trained personnel, due to the dangers of electrical shock.

1.3.6 Cleaning

Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. See section 5.2 Cleaning for a cleaning instruction!

1.3.7 Re-packing

Keep the original shipping carton and packing material; they will come in handy if you ever have to ship your unit. For maximum protection, repack your set as it was originally packed at the factory.

1.4 Online documentation

On the iStudio – Manuals & Supplement, CD-ROM **R5976593** this manual **R5976260** as well as the iStudio user's manual **R5976569** can be found in electronically form. Insert the CD in the CD ROM drive to view the manual. If autorun is enabled on the computer the start page of the CD comes up automatically. Else open the start page **index.html** of the CD manually.

On this start page you will find a link to the user's manual of Hydra.

Acrobat Reader can be used to view the file. Adobe® Acrobat® Reader is free and freely distributable software that lets you view and print Adobe Portable Document Format (PDF) files.

If Acrobat Reader is already installed, the manual can be viewed just by a click on the respective link. Else the Acrobat Reader must be installed first. The required installation files can also be found on the CD.

2 Summary

This chapter gives an overview about the features of HYDRA.

2.1 Properties

iStudio is a complete video, audio and data monitoring system. It typically consists out of one or more Hydra controllers, a visualization system (usually a rear projection Display Wall) and the iStudio software to manage the complete system.

Hydra

Hydra is the hardware part of the iStudio system. Different video signals (analog, SDI or HD-SDI), RGB data as well as audio sources (analog, digital or embedded) can be connected to a Hydra module by means of its Streaming video cards, SDI video input cards, HD-SDI video input cards, analog video input cards, RGB input cards and digital or analog audio cards. Thus each Hydra might monitor up to 60 video sources and up to 112 audio sources (56 stereo pair or 112 mono channels) depending on the configuration and provides an analog, digital or video output signal or combinations of them to display the sources on a visualization system. Furthermore the Hydra processes tallies and different kind of VBI. Either hardware tallies, connected via GPIO or software tallies can be used. Closed captions, XDS, wide screen signaling and VITC can be detected and displayed.

The Hydra is a computer, whose operating system is stored on the iStudio – Hydra boot CD, including a web server. This enables to simply connect to and operate the Hydra from any PC connected to the same LAN as the Hydra. On the PC simply a standard web browser is required.

The Hydra is optimized for uninterrupted, fault free operation. Therefore the Hydra uses a redundant quad module power supply with two different power inputs. In this way failing of one power net or power supply module will not power down the Hydra. The operating system is burned on CD and by this can not get corrupt. For data storage a flash disk is used. In addition the output of one Hydra can be inserted to another Hydra; in case that a projection module of one Hydra fails, the other Hydra displays a combined output of both units.

If the number of displayed sources exceeds the capacity of one Hydra, or if the sources shall be displayed on a larger area multiple units can be used. The iStudio software enables to easily operate all of these Hydras commonly as one wall.

The figure below shows a Display Wall consisting in three projection modules each connected to one Hydra. These Hydras are connected via the LAN to a PC that enables the control of the Hydras and their output for the Display Wall by means of the iStudio GUI, available through the web browser. The various input sources are directly connected to the Hydra units.

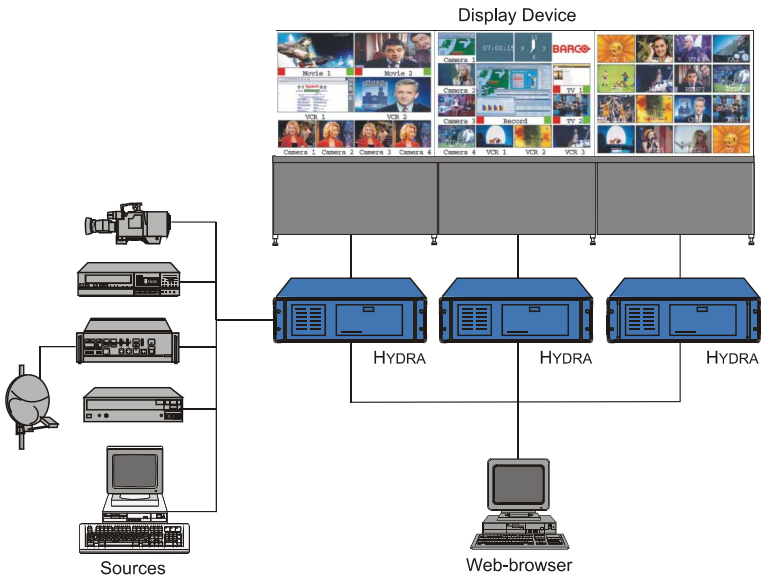


Figure 2-1
Setup with 3 Hydras

iStudio

The iSTUDIO software enables the control of the HYDRA as well as the management of the content of the connected display. Multiple HYDRAS can be grouped to a wall and operated commonly. Besides of video and audio windows, also windows with content like text, logos, clocks, timers, a stopwatch or alarms can be displayed. Furthermore applications and viewers can be started and displayed. The arrangement of these windows and the combination of such layouts of different HYDRA can be stored and re-accessed. iSTUDIO provides the functionality to integrate alarm indicators and the detected VBI and tallies in the respective video windows.

Parthenope

If audio cards are used in the HYDRA, the audio breakout box PARTHENOPE provides the possibility to connect two or four EDAC 90 connectors with the audio input and to convert them to two or four SCSI-4 connectors for insertion at the input of the audio cards. PARTHENOPE comes in two versions: 56 or 112 (mono) channel version (two or four EDAC-90 connectors).

NGM-164

The external device NGM-164 sends audio metering data and audio alarms of audio sources via the Ethernet to the HYDRA thus enabling to monitor up to 64 or, if using multiple NGM-164 units even more audio sources. This enables the HYDRA to monitor lots of audio channels without occupying slots for that purpose.

3 Getting started

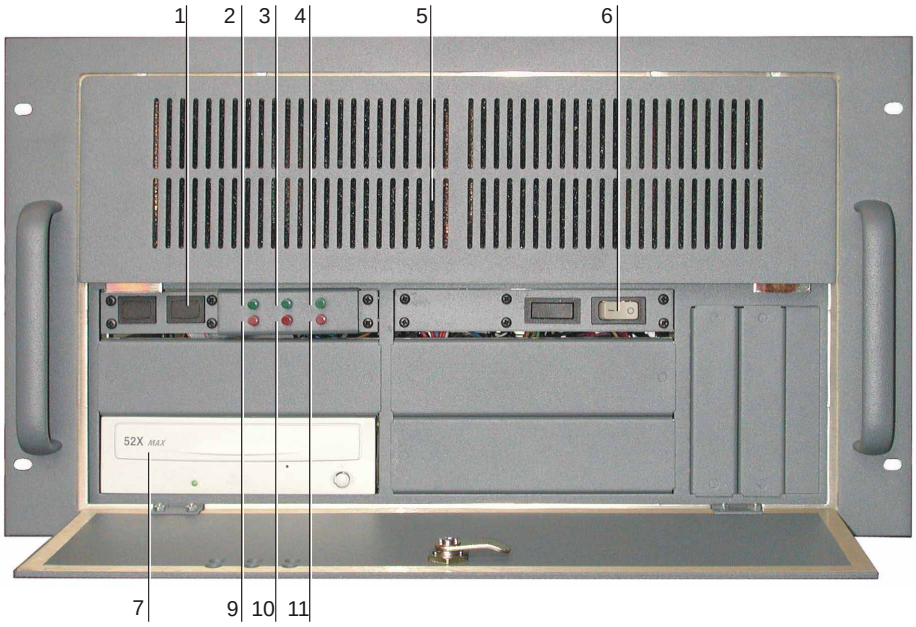
This chapter describes the set up of HYDRA. If your HYDRA is already configured within your working place you can skip this chapter and continue with chapter 4 Operating.

3.1 Examining

3.1.1 Hydra

The Front

The front of your HYDRA looks like this or similar:



1	reserved for future use!
2	**green LED: power OK**
3	**green LED: booting**
4	**green LED: software heartbeat**
5	**air supply**
6	**power switch**
7	**CD ROM drive**
9	**red LED: power unit failed**
10	**red LED: boot error**
11	**red LED: system error**

Figure 3-1
Front view of HYDRA

Under the air supply openings [5] there are operating controls. On the right side there is the **power switch** [6]. On the left side at the bottom there is the **CD ROM drive** [7]. Under the air supply openings on the left side there are all together six LEDs [2-4] and [9-11] to record the operating state of HYDRA, please see also the table below.

Please be carefull when inserting a CD, the CD-ROM drive closes automatically after a while!

The table below lists the names and functionality of the LED's at the front of HYDRA:

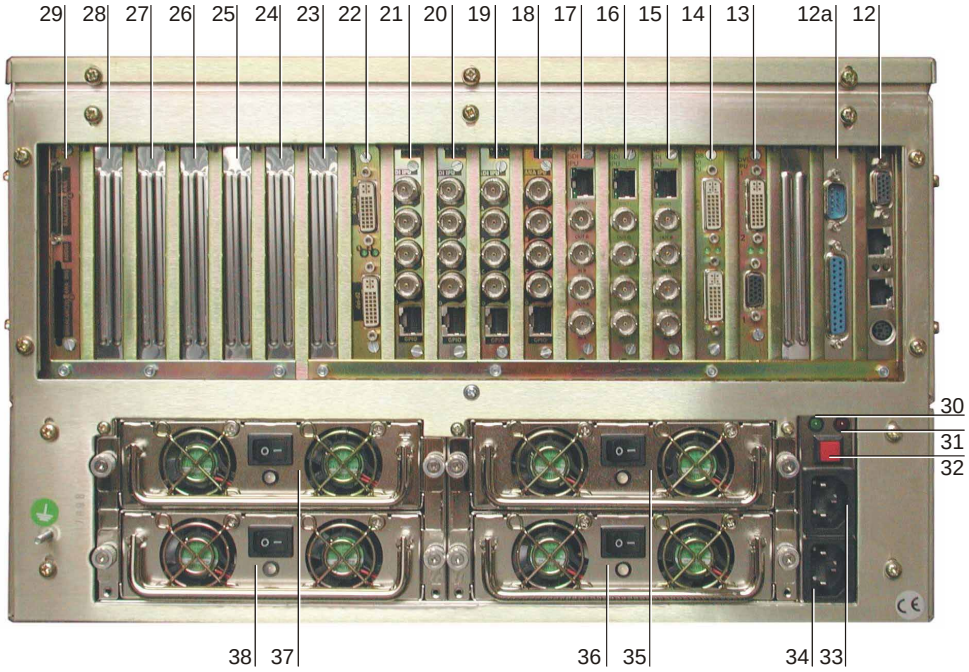
number	name	state	meaning
[2] green	**power OK**	**ON – permanent** **OFF**	+3.3 V on the overlay board is OK +3.3 V on the overlay board failed
[9] red	**power unit failed**	reserved for future use	
[3] green	**booting**	**ON – blinking** **ON – permanent**	HYDRA gets configured HYDRA configuration was successful
[10] red	**booting failed**	**ON - blinking** **OFF**	HYDRA configuration failed HYDRA configuration was successful
[4] green	**software heartbeat**	**ON – blinking** **OFF**	HYDRA software is running (starts running after successful configuration) HYDRA software is down
[11] red	**system error**	**ON – blinking** **OFF**	operation error occurred no operation error

Table 3-1
Allocation of LEDs on front of HYDRA

Details concerning **software heartbeat** [4] and **system errors** [11] can be seen in the **Module Status** and **Wall Alarms** list, please refer to the sections Module Status and Wall Alarms Area in the iSTUDIO user's manual.

The Back

The back of your HYDRA looks like this or similar:



12	**single board computer**
12a	**serial port extension of single board computer**
13	**overlay input**
14-29	**slots for video and RGB input cards, output cards and audio boards** e.g. 14 RGB input card, 15 – 17 HD SDI video input cards, 18 Quad analog video input card 19 – 21 Quad SDI video input card 22 output card, 23 – 28 empty slots 29 audio boards
30	**green LED, power failure**
31	**red LED, fan failure**
32	**buzzer reset button**
33	**mains connection 1**
34	**mains connection 2**
35	**power module 1**
36	**power module 2**
37	**power module 3**
38	**power module 4**

Figure 3-2
Rear view of HYDRA

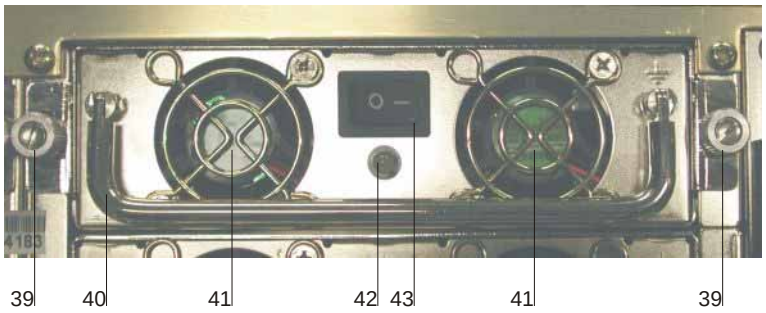
All boards are inserted in the upper part of the back of HYDRA. On the right there is the **single board computer** [12] and the **overlay input card** [13]. Next to them there are 16 slots available to integrate the various cards, like **analog video cards**, **RGB input cards**, **HD-SDI video input cards** and **SDI video cards**, different type of output cards and audio boards.

On the lower part of the back of HYDRA the power supply is located. On the right hand side there is a dual mains connection [33, 34]. Here with two power cables two independent power nets can be connected. Over the dual mains connection there is the **buzzer reset button** [32], the **red LED** [31] to indicate a fan failure and the **green LED** [30] to indicate a power failure. On the left hand side there are four hot swap power modules [35-38].

To protect HYDRA from overheating, the air supply openings in the case shall be kept free of obstructions. A space of at least 1U between top and bottom respectively to the adjacent devices must be left!

The Power Modules (Detail)

The power modules on the back of HYDRA look like this or similar:



39	**securing screws**
40	**handle**
41	**vent for fan**
42	**green LED**
43	**power switch**

Figure 3-3
Power module on the rear of HYDRA

The power modules are fixed with **securing screws** [39] on the case of HYDRA. Across the power module there is the **handle** [40]. On the top of the middle there is the **power switch** [43], below it there is a **green LED** [42], indicating operation.

The allocation of the LEDs is explained in the table below:

number	name	state	meaning
[30] green	**power failure**	**ON – permanent**	power supply and power modules OK
		ON – blinking and Buzzer is active	one or more power modules failed / one or more power cords are disconnected
[31] red	**fan failed**	**OFF**	all fans are working
		ON	one fan failed
[42] green	**power module**	**ON**	power module is working
		OFF	Power unit failed

Table 3-2
allocation of LED's on the back of HYDRA

3.2 Cabling

3.2.1 Power supply

Check the power rating on your outlet before connecting HYDRA to the wall outlet or to a power strip. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.

HYDRA is designed to operate with single-phase power systems having a grounded neutral conductor. To reduce the risk of electrical shock, do not plug into any other type of power system.

The HYDRA has a dual power input therefore two power nets can be connected. To connect HYDRA to the power supply, follow these steps:

- Plug the female end of the one power cord into the mains connection [33].
- Plug the female end of the other power cord into the mains connection [34].

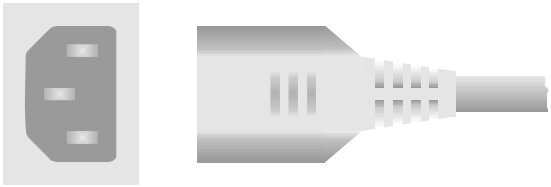


Figure 3-4
Mains connection of HYDRA

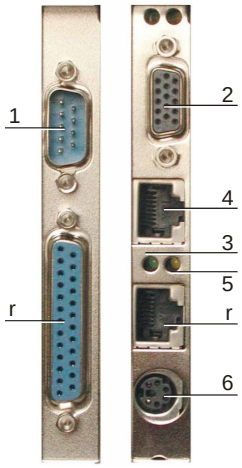
- Plug the male end of both power cords into the two designated power outlets.

3.2.2 Single board computer

The HYDRA is connected to the LAN via the Ethernet connector on the single board computer.

Connectors

The connectors of the single board computer are not only on the front plate of the single board computer but also on a corresponding slot plate for the serial port, please see the figure below.



1	serial port
2	VGA connector (only used for service)
3	green LED
4	Ethernet connector
5	yellow LED
6	PS/2 keyboard or PS/2 mouse (only used for service)
r	*reserved for future use*

Figure 3-5
Ports of single board computer /2 and corresponding slot plate

To connect the HYDRA to the **Ethernet connector** [4], a 100Base-T cable with twisted transmitter and receiver pairs must be used.

Besides a **PS/2 keyboard/mouse connector** [6] and **VGA connector** [2] (both not used during standard operation of the HYDRA) there is a standard **serial port connector** [1].

Order

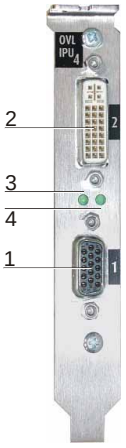
The single board computer is always inserted to the right in the first slot with the slot plate in the next slot to the left (counted from right to left, if looking from back on the HYDRA).

3.2.3 Overlay input card

The overlay input card has an input connector that can be used to integrate digital graphical data with the data from the SBC. Input can be any graphical data with the appropriate timing and resolution. In particular the overlay input card can be used to configure the system for redundant operation, please see section 4.3 Redundant operation.

Connectors

The current model of the overlay input card OVL IPU /4 provides a DVI-I connector to insert digital data and a D15 connector to insert an external time code signal (LTC or VITC) or a genlock source.



1	**connector LTC, VITC or genlock (D15)**
2	**input connector (DVI-I) for digital graphic data**
3	**green LED – DVI input active**
4	**green LED – active genlock**

Figure 3-6
Ports of the overlay input card OVL IPU/4

The green LED [3] on the left indicates, if a signal for the background is active. The green LED [4] on the right indicates, if a genlock, LTC or VITC signal is active.

Order

The overlay input card is inserted on the left side of the single board computer (looking from back on the HYDRA) leaving exactly one empty slot between itself and the slot plate of the single board computer.

The timing of the graphical external source should correspond to the timing selected with the iStudio GUI (Setup Module – Timing).

The DVI connector provides DDC timing information to enable a graphic output device with DDC capability to adapt to the required timing.

3.2.4 Video input card

To integrate analog video, SDI video and HD-SDI video, there are different types of video input cards available for use in the HYDRA. Each board except the Streaming video card is additionally equipped with a RJ45 GPIO connector for user specified functions like tallies or alarms. Furthermore there is an LED for each input connector to indicate, if there is a video connection or not.

Depending on the type of the video input card up to 60 video sources can be processed and displayed by one HYDRA.

Order

The video input cards are inserted into the slots on the left of the overlay input card (looking from the back on the HYDRA). The order of the various video input cards and the RGB input cards can be chosen arbitrarily. One exception from this is the combination of Quad SDI video input cards and RGB input cards since the RGB input cards can not be inserted directly to the left of the Quad SDI video input cards. Either a card of another type can be inserted between these cards or the RGB input cards can be inserted to the right of the Quad SDI video input cards.

There is no empty slot allowed between overlay input card and video/RGB input cards and between the video/RGB input cards themselves!

Maximal number of video input cards

The maximum number of video input cards that can be used in one HYDRA depends on the amount of other used cards within that HYDRA. The following rule must be applied for a HYDRA with redundant power net:

$$50 \geq 3 + (H * 4.7) + (V * 3.1) + (S * 3.8) + (R * 4) + O + (ODDda * 2.5) + (ODDds * 2) + (ODDd * 0.5) + (ODV * 1.8) + (A * 0.8)$$

With a non-redundant power net the following rule must be applied:

$$65 \geq 3 + (H * 4.7) + (V * 3.1) + (S * 3.8) + (R * 4) + O + (ODDda * 2.5) + (ODDds * 2) + (ODDd * 0.5) + (ODV * 1.8) + (A * 0.8)$$

In non-redundant operation most configurations can be made whereas redundant operations is a bit more restrictive. In any case the above formula must be checked carefully.

The following abbreviations are used:

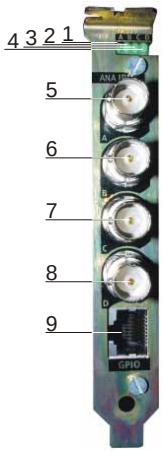
- **H** number of HD-SDI input cards
- **V** number of Quad analog video input cards, Quad SDI input cards and of the obsolete Dual analog video input cards and Dual SDI input cards
- **S** number of Streaming video cards
- **R** number of RGB input cards
- **O** number of the obsolete one channel output cards MDR 26 – D15
- **ODDda** number of DVI-DVI digital/analog output cards
- **ODDds** number of DVI-DVI digital output card with scaling
- **ODDd** number of DVI-DVI digital output cards
- **ODV** number of DVI-video output cards
- **A** number of the audio mother boards.

Quad analog video input card

On the Quad analog video input card there are four BNC connectors to insert four analog video signals, a 10 pin RJ45 GPIO connector that enables to have two tallies per video and four green LED's.

Standards

The Quad analog video input card supports composite video with the international broadcasting standards PAL, NTSC or SECAM.



1	**green LED path A**
2	**green LED path B**
3	**green LED path C**
4	**green LED path D**
5	**analog video input channel A**
6	**analog video input channel B**
7	**analog video channel C**
8	**analog video channel D**
9	**RJ45 GPIO connector**

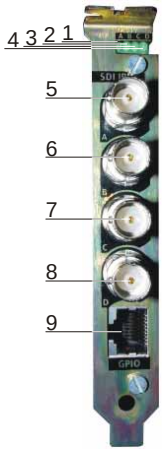
Figure 3-7
Connectors of Quad analog video input card

Quad SDI video input card

On the Quad SDI video input card there are four BNC connectors to insert four SDI video signals, a 10 pin RJ45 GPIO connector that enables to have two tallies per video and four green LED's.

Standards

The Quad SDI video input card supports the standard SMPTE 259M-C (4:2:2, 270Mbps only).



1	**green LED path A**
2	**green LED path B**
3	**green LED path C**
4	**green LED path D**
5	**SDI input channel A**
6	**SDI input channel B**
7	**SDI input channel C**
8	**SDI input channel D**
9	**RJ45 GPIO connector 10 pin**

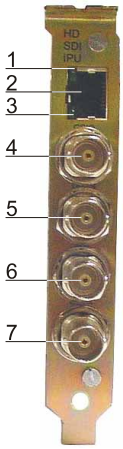
Figure 3-8
Connectors of Quad SDI video input card

HD-SDI video input card

On the HD-SDI video input card there are four BNC connectors; two connectors are to insert the HD-SDI video signals and two connectors are to loop through the signals to another monitor. Furthermore there is a 8 pin RJ45 GPIO connector that enables to have three tallies per video and two green LED's.

Standards

The HD-SDI video input card support the SMPTE 292M standard.



1	**green LED path B**
2	**RJ45 GPIO connector**
3	**green LED path A**
4	**loop-through HD-SDI channel B**
5	**HD-SDI input channel B**
6	**loop-through HD-SDI channel A**
7	**HD-SDI input channel A**

Figure 3-9
Connectors of HD-SDI video input card

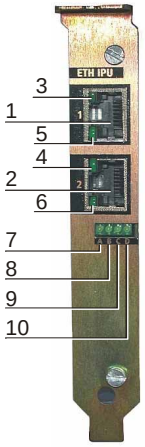
All unused outputs of the HD-SDI video input card ([4] and [6]) should be terminated with a 75 Ohm BNC terminator!

Streaming video card

The Streaming video card connects to the Ethernet to receive and process up to four video streams. The card is equipped with two RJ45 connectors and with all together eight LED's to indicate the connection status of the board.

Standards

The Streaming video card supports various compression algorithms over Ethernet. Please refer also to section 6.1 Technical data for detailed information.



1	**RJ45 Network connector 1**
2	**RJ45 Network connector 2**
3	**green LED: connector 1 connected to the Ethernet**
4	**green LED: connector 2 connected to the Ethernet**
5	**green LED: ON connector 1 connected with 100 Mbps OFF connector 1 connected with 10 Mbps**
6	**green LED: ON connector 2 connected with 100 Mbps OFF connector 2 connected with 10 Mbps**
7	**stream 1 is active**
8	**stream 2 is active**
9	**stream 3 is active**
10	**stream 4 is active**

Figure 3-10
Connectors of Streaming video card

Connection

The two **RJ45 network connectors** [1, 2] establish the connection to the network. For a redundant connection a network cable should be plugged into each of the plugs [1] and [2]. These network cables should connect on the other side to a redundant network. In case of a failure of one connection the other connection will take over the complete network traffic.

If a redundant connection is not required either plug [1] or plug [2] can be used for the connection.

Both plugs use the same IP and MAC address, thus no configuration in regard of the used plug is required.

3.2.5 RGB input card

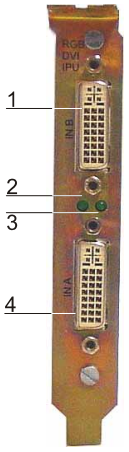
The RGB input card has two independent DVI plugs to connect two analog or digital RGB sources to the HYDRA. Two LED's indicate whether there is a source connected or not (one LED for each RGB input channel).

Standards

The RGB input card processes analog RGB and HD-RGB input signals, digital RGB input and component video RGB.

Connectors

On the RGB input card there are two DVI-I connectors and two green LED's.



1	**IN B – DVI-I connector**
2	**green LED IN B**
3	**green LED IN A**
4	**IN A – DVI-I connector**

Figure 3-11
Connectors of RGB input card

Order

For the order in which the RGB input cards are inserted in the Hydra applies the same rule as for the video input cards, please refer to section 3.2.4 Video input card.

Maximal number of RGB input cards

In a Hydra with redundant power net there can be up to 4 RGB input cards and in a Hydra with a non-redundant power net up there can be up to 5 RGB input cards used.

3.2.6 Output card

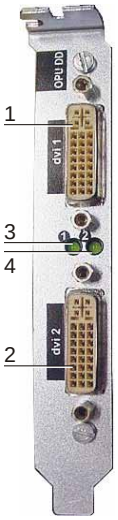
The HYDRA supports different types of output cards. Current models are the DVI-DVI digital output cards with scaling, the DVI-DVI digital/analog output cards, the DVI-DVI digital output cards and the DVI-video output cards.

DVI-DVI digital output card with scaling

The DVI-DVI digital output card with scaling provides the facility to connect two projection modules or monitors for the graphical output of the HYDRA. The output data is provided for digital connection. The card allows additionally scaling of the output. The front plate is labeled with **OPU DD**.

Connectors

On the DVI-DVI digital output card with scaling there are two DVI-I connectors.



1	DVI-I connector for digital output channel 1
2	DVI-I connector for digital output channel 2
3	green LED output channel 1: lightens up once after successful boot process
4	green LED output channel 2: lightens up once after successful boot process

Figure 3-12
Connectors of DVI-DVI digital output card with scaling

Dual mode

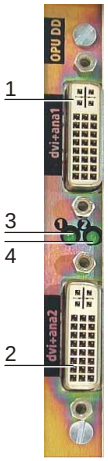
To use dual mode, the second output channel is used for a second display device. Please refer to section 4.4 Dual mode for appropriate cabling.

DVI-DVI digital/analog output card

The DVI-DVI digital/analog output card provides the facility to connect two projection modules or monitors for the graphical output of the HYDRA. The output data is provided for analog and digital connection. The card allows additionally scaling of the output. The front plate is labeled with **OPU DD**. The text next to the connectors reads as **dvi+ana1/2**.

Connectors

On the DVI-DVI digital/analog output card there are two DVI-I connectors.



1	DVI-I connector for digital/analog output channel 1
2	DVI-I connector for digital/analog output channel 2
3	green LED output channel 1: lightens up once after successful boot process
4	green LED output channel 2: lightens up once after successful boot process

Figure 3-13
Connectors of DVI-DVI digital/analog output card

Dual mode

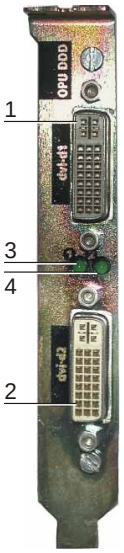
To use dual mode, the second output channel is used for a second display device. Please refer to section 4.4 Dual mode for appropriate cabling.

DVI-DVI digital output card

The DVI-DVI digital output card provides the facility to connect two projection modules or monitors for the graphical output of the HYDRA. The output data is provided for digital connection. The front plate is labeled with **OPU DDD**.

Connectors

On the DVI-DVI digital output card there are two DVI-I connectors.



1	DVI-I connector for digital output channel 1
2	DVI-I connector for digital output channel 2
3	green LED output channel 1: lightens up once after successful boot process
4	green LED output channel 2: lightens up once after successful boot process

Figure 3-14
Connectors of DVI-DVI digital output card

Dual mode

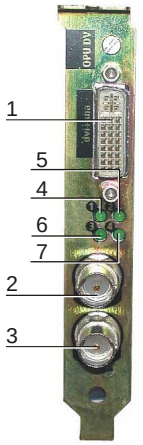
To use dual mode, the second output channel is used for a second display device. Please refer to section 4.4 Dual mode for appropriate cabling.

DVI-video output card

The DVI-video output card provides the facility to connect simultaneously the same content on two display devices of different type. These are on the one hand a projection module or monitor for digital or analog input and on the other hand a device capable to display a video timing. The front plate of the DVI-video output card is labeled with **OPU DV**.

Connectors

On the DVI-video output card there are three connectors: one DVI-I connector and two BNC connectors.



1	DVI-I connector for digital/analog output (digital and analog signal are available at the same time)
2	BNC connector for CVBS output
3	BNC connector for SDI output
4-6	green LEDs 1-3 *(reserved for future use)*
7	green LED 4: lightens up once after successful boot process

Figure 3-15
Connectors of DVI-video output card

Dual mode

In dual mode a second output card is inserted next to the first output card. The first output card must be connected to the left projection module seen from front of the Display Wall. The second output card is connected to the right projection module. Please refer also to section 4.4 Dual mode.

Order

The output cards are inserted into the slot on the left of the last video/RGB input cards (looking from the back on the HYDRA).

There is no empty slot allowed between the last video/RGB input card and the output card!

3.2.7 Audio board

The audio boards serve to monitor audio signals. An audio board consists of an audio motherboard and one or two audio daughterboards, which are plugged on the audio motherboard. Up to two audio motherboards can be used in one HYDRA.

The audio input is inserted into the audio daughterboards. A daughterboard is of analog balanced, digital balanced or digital unbalanced type. On an audio motherboard analog and digital daughterboards can be mixed. On one daughter board there are 28 mono or 14 stereo channels available. This means an audio motherboard may contain 56 channels. A HYDRA with maximal two audio motherboards may monitor herewith 112 audio channels.

Connectors

Each audio daughterboard is equipped with a SCSI-4 connector. The figure below shows an audio board, fully equipped with two daughterboards of digital unbalanced type:

1	SCSI port 1
2	SCSI port 2

Figure 3-16
Connectors of analog and digital daughterboard

The writing on the front plate of the audio board differs according to the type of daughter boards, which are plugged on it, nevertheless the numbering of the ports remains the same. The following table lists which writing on the front plate refers to which audio daughter board:

Writing	Type of daughterboard
BALANCED ANA	Analog balanced
BALANCED DIG	Digital balanced
UNBALANCED DIG	Digital unbalanced
[redacted]	No daughterboard

Table 3-3
Writing on the audio board

The SCSI cable between the audio boards and Parthenope are not very strong. Handle them with care. Do not bend!

If connecting 600 Ohm audio sources to an analog audio daughterboard, then to receive best signal quality the audio input at the Hydra should be terminated with a 600 Ohm resistor!

Order

The audio boards are inserted into the slots on the left of the output card (looking from the back on the HYDRA).

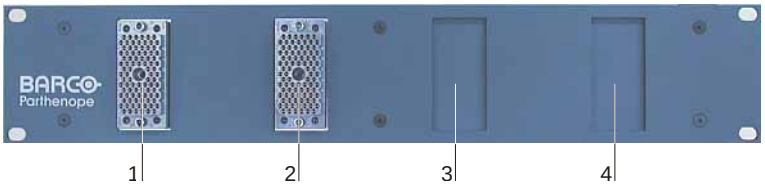
3.2.8 Parthenope

The audio breakout box PARTHENOPE adapts the audio cabling via EDAC 90 connectors to the SCSI4 input on the audio boards.

The EDAC 90 connectors on PARTHENOPE can be installed on the front or on the rear of the device.

The front

The front of PARTHENOPE looks like this or similar:



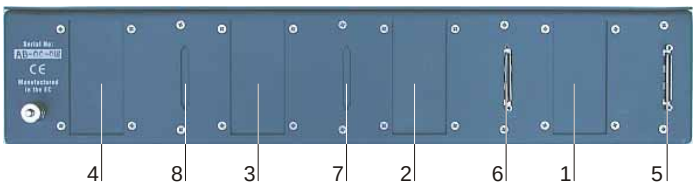
1 – 4	**EDAC 90 connectors**

Figure 3-17
Front view of PARTHENOPE

On the front of PARTHENOPE there may be two or four **EDAC 90 connectors** [1-4].

The rear

The rear of PARTHENOPE looks like this or similar:



1 – 4	**EDAC 90 connectors**
5 – 8	**Respective SCSI connectors**

Figure 3-18
Rear view of PARTHENOPE

On the rear of PARTHENOPE there may be two or four **EDAC 90 connectors** [1-4] (if not installed on the front) and according to the number of EDAC 90 connectors, two or four **SCSI connectors** [5-8].

The SCSI cable between the audio boards and Parthenope are not very strong. Handle them with care. Do not bend!

Connection to the EDAC connectors

The EDAC connector has 28 inputs. Each of these inputs consists of three jacks.

To connect an analog audio stereo source two adjacent inputs are needed. The input with the odd number is used for the left channel; the input with the even number is used for the right channel. This means that 14 stereo sources can be connected per EDAC connector.

To connect a digital audio source only the inputs with the odd numbers are used. This means that also 14 stereo sources can be connected.

Each channel has three connections, the hot connection (**v+**), the cold connection (**v-**) and the ground (**gnd**).

To receive the best noise immunity when connecting the various sources to the EDAC connector the following instructions must be followed for **analog** audio sources:

Three wire analog balanced connection

- Connect the hot output of the source via the hot wire of the cable to **v+** of the EDAC connector!
- Connect the cold output of the source via the cold wire of the cable to **v-** of the EDAC connector!
- Connect the ground/shield of the source via the ground/shield of the cable to the **GND** of the EDAC connector!

Three wire analog unbalanced connection

- Connect the hot output of the source via the hot wire of the cable to **v+** of the EDAC connector!
- Connect the ground/shield of the source to the ground/shield of the cable!
- Connect the ground/shield of the source to the **v-** of the cable!
- Connect **v-** of the cable with the **v-** of the EDAC connector!
- **GND** of the EDAC connector is usually not connected but depending on the source, it could be necessary to connect the **GND** of the EDAC connector also!

Two wire analog unbalanced connection

- Connect the hot output of the source via the hot wire of the cable to **v+** of the EDAC connector
- Connect ground/shield of the source via the ground/shield of the cable to **v-** of the EDAC connector
- **GND** of the EDAC connector is usually not connected but depending on the source, it could be necessary to connect the **GND** of the EDAC connector also!

When connecting digital unbalanced ADS3-ID 75 audio signals to a digital unbalanced board, the following wiring can be used:

Three wire digital unbalanced connection

- Connect the hot output of the source via the hot wire of the cable to **v+** of the EDAC connector!
- Connect the ground/shield of the source to the ground/shield of the cable!
- Connect the ground/shield of the source to the **v-** of the cable!
- Connect **v-** of the cable with the **GND** of the EDAC connector!
- **v-** of the EDAC connector is not connected!

Two wire digital unbalanced connection

- Connect the hot output of the source via the hot wire of the cable to **v+** of the EDAC connector!
- Connect ground/shield of the source via the ground/shield of the cable to the **GND** of the EDAC connector!
- **v-** of the EDAC connector is not connected!

When connecting digital balanced ADS3 110 audio signals to a digital balanced board, the following wiring can be used:

Three wire digital balanced connection

- Connect the hot output of the source via the hot wire of the cable to **v+** of the EDAC connector!
- Connect the cold output of the source via the cold wire of the cable to **v-** of the EDAC connector!
- Connect the ground/shield of the source via the ground/shield of the cable to the **GND** of the EDAC connector!

It is recommended to only connect suitable digital audio signals to the digital audio boards, i.e. a balanced digital audio signal to a digital balanced audio board or an unbalanced digital audio signal to an unbalanced digital audio board.

If the signal is not suitable an impedance matching transformer should be used first to convert the signal to a suitable standard!

3.2.9 NGM-164

If using audio metering information of an NGM-164 it has to be connected to the same LAN as the HYDRA.

More information can be found in the user manual **R59770028** which is also on the iSTUDIO – Manuals & Supplement, CD-ROM **R5976593**, please refer to section 1.4 Online documentation.

3.2.10 Patch panel

To easily connect signals provided via cables with BNC connector a BNC patch panel can be used. The patch panel is a plate that can easily be fixed into the rack and serves to connect the BNC cables coming from video or RGB sources with the dedicated cables that are connected to the Dual analog video cards of the HYDRA (4 x BNC to HD15P) or to the RGB input card. It consists of two rows of 15 BNC connectors each. The drawing below illustrates the patch panel:

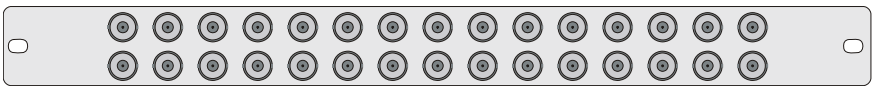


Figure 3-19
Patch panel

3.3 Starting up

3.3.1 Connecting

First of all you have to provide the appropriate power supply. Plug in the power cable on the back panel of your HYDRA. Please, refer to section 3.2.1 Power supply!

Connect your HYDRA to the local area network! Connect the network to the Ethernet connector of the single board computer! Please, refer to section 3.2.2 Single board computer!

Connect your video sources to the video input cards and the RGB sources to the RGB input cards, if advisable use the patch panel. Please, refer to section 3.2.4 Video input card, 3.2.5 RGB input card and 3.2.10 Patch panel!

Connect the intended display devices to the output card. Please, refer to section 3.2.6 Output card!

If necessary, connect the audio sources to the digital and analog audio daughter boards. Please, refer to section 3.2.7 Audio board and 3.2.8 Parthenope! If information of an NGM-164 is used check that it is connected to the LAN; please refer to section 3.2.9 NGM-164.

3.3.2 Switching on

When taking the HYDRA for the first time into operation, first the iSTUDIO – Hydra boot CD must be inserted into the CD-ROM drive. Therefore follow the above mentioned steps:

- To switch on the HYDRA, press the power switch [6] on the front of HYDRA.
- Check the state of the green LED power [30] on the back of HYDRA. It must be permanently on to indicate that the power supply operates properly. If this is not the case, see section 7.1 Hydra does not start up please.
- Open the CD-ROM drive [7]. If the CD-ROM drive does not stay open, retry opening it until it stays open.
- Insert the iSTUDIO – Hydra boot CD **R32875211** in the drive and close it.
- Switch off the HYDRA with the power switch [6].
- Switch it on again.

If the iSTUDIO – Hydra boot CD **R32875211** is already in the CD-ROM drive then just:

- Press the power switch [6] on the front of HYDRA.
- Check the state of the green LED power [30] on the back of HYDRA. It must be permanently on to indicate that the power supply operates properly. If this is not the case see section 7.1 Hydra does not start up please.

Now the HYDRA starts booting from the iSTUDIO – Hydra boot CD. The startup screen is displayed. By default it shows the Barco logo together with the IP address of the HYDRA, which is displayed in the upper left corner. (If the HYDRA already has been configured also another startup screen could appear, dependent on the configuration of the startup layout.) As soon as the start screen is displayed, the HYDRA is ready for operation and a connection from an operator PC to the HYDRA can be established. This and any further operation is explained in detail in the iSTUDIO user's manual.

Figure 3-20
HYDRA startup screen

3.3.3 Switching off

If the HYDRA was operated with the iSTUDIO software it must be halted before it can be switched off. Therefore use the command **Halt module** of the **Module** menu, please refer to the iSTUDIO user's manual, section Module Control. This command halts the HYDRA. If you want to switch off all HYDRA units of a wall you also can use the command **Halt wall** from the **Wall** menu. When the HYDRA is halted it stops to send an output signal to the projection modules and they show their original display, e.g. a black or blue screen. If so the HYDRA can be switched off with the power switch [6] at the front of it.

4 Operating

This chapter provides information about internal settings, extended video functionality and advanced configurations of the HYDRA.

It does not explain, how the HYDRA is used to monitor and display video and RGB sources, but this can be found in detail in the iSTUDIO user's manual. iSTUDIO is just accounted as far as necessary to understand the substance of this chapter.

4.1 BIOS and boot agent settings

There exist multiple versions of the single board computer (SBC).

The current version is the SBC/2. It can be recognized by its usage of two slot plates, please refer also to section 3.2.2 Single board computer.

The two predecessors of the current board exist in one version with 233 MHz and one version with 566 MHz processor speed. They use just one slot plate. The 233

This section is intended for adjustment of the BIOS of the 233 MHz version. Furthermore the HYDRA specific BIOS settings of SBC/2 and the 566 MHz version as well as the boot agent settings of the SBC/2 are listed.

For the single board computer with 233 MHz processor speed there exist two cases where the BIOS settings of the SBC need to be changed, depending on the overlay version of the overlay input card.

- **Upgrading**
  First case is after an upgrade to iSTUDIO release 1.6 or higher with all the additional conditions fulfilled:
  - the HYDRA is equipped with a prior model of the single board computer 233 MHz processor speed
  - the overlay input card has overly version 9 or higher
  - the HYDRA was operated with an output resolution for projection modules with 1024×768 pixels (XGA, one module or dual mode) before the upgrade to the release 1.6 or higher of the iSTUDIO software.

  The BIOS settings have to be changed to SXGA (1280×1024 pixels). The BIOS settings are important for internal data processing but do not determine the output resolution of the HYDRA.
- **Changing the output resolution**
  Second case is when changing the output resolution of the HYDRA (connecting to a different type of projection module with different display resolution) with all the additional conditions fulfilled:
  - the HYDRA is equipped with a prior model of the single board computer 233 MHz processor speed
  - the overlay input card has overly version 8 or lower

  The respective output resolution must be adapted to the BIOS settings. Output resolution XGA requires XGA BIOS settings, output resolution SXGA or UXGA requires BIOS settings SXGA.

The version of the overlay input can be checked by means of the **Note** list when displaying the **Module Status** dialog, please refer to the iSTUDIO user's manual, section Module Status. To distinguish between the two types of single board computers and to change the BIOS settings respectively the following must be done.

4.1.1 Entering the BIOS or boot agent

To distinguish between the 233 MHz version and 566 MHz version of the SBC the values showed during startup can be used, respectively it reports 233 MHz or 566 MHz processor speed. To access the BIOS, the SBC must be connected to a monitor and a keyboard, therefore follow the steps below:

- Halt the HYDRA. When the HYDRA has halted, switch it off by the power button on the front of it, see section 3.3.3 Switching off.
- Connect a monitor to the VGA connector [2] of the single board computer and a PS/2 keyboard to the PS/2 keyboard/mouse connector [6] of the single board computer, see section 3.2.2 Single board computer.
- Switch on the HYDRA by pressing the power switch [6] of the HYDRA again.
- To enter the BIOS, check the displayed values on the connected monitor and keep the **DEL** key of the keyboard pressed until the BIOS setup is started. If the **DEL** key was pressed too late and the possibility to enter the setup has passed, restart the HYDRA with the key combination **CTRL ALT DEL**.
- To enter the boot agent setup of the SBC/2 press keep the **SHIFT**- and **F10** key of the keyboard pressed until the boot agent setup is started.

4.1.2 BIOS settings

The table below lists the HYDRA specific BIOS settings that must be selected for proper operation of the SBC/2:

path	setting
Advanced BIOS Feature -> First Boot Device	CDROM
Advanced BIOS Feature -> Second Boot Device	LAN
Advanced BIOS Feature -> Third Boot Device	Floppy
Advanced Chipset Features -> Frame Buffer Size	32M
Advanced Chipset Features -> Panel Type	06
Integrated Peripherals -> Primary Master PIO	Mode 3

Table 4-1
BIOS settings of SBC/2

The table below lists the HYDRA specific BIOS settings that must be selected for proper operation of the SBC with 566 MHz processor speed:

path	setting
Inside Utilities -> Display Setup -> Embedded VGA/LCD/TV Type	CRT1 + LCD
Inside Utilities -> Display Setup -> Set Panel Type	1280x1024
	TFT Color
	IBM
	ITSX94

Table 4-2
BIOS settings of SBC 566 MHz

For an SBC with 233 MHz processor speed there are multiple scenarios depending on the overlay input version of the overlay input card and on the output resolution of the HYDRA. The below values are valid from iSTUDIO release 1.6 on:

path	settings	
	overlay version 9 or higher or overlay version 8 or lower with SXGA or UXGA output of HYDRA	overlay version 8 or lower with XGA output of HYDRA
processor clock	233/66 MHz	233/66 MHz
Display Type	CRT & PANEL	CRT & PANEL
SDD-DRIVE	M-SYSTEM	M-SYSTEM
PANEL DRIVER -> Resolution	1280x1024	1024x768
PANEL DRIVER -> Technology	TFT color	TFT color
PANEL DRIVER -> Manufacture	Standard	Samsung
PANEL DRIVER -> Code	1280x1024TFT	LT151X1-2

Table 4-3
BIOS settings of SBC 233 MHz

Take care not to use the entry »default settings« as this applies other settings than mentioned above. Nevertheless if so, please readjust the BIOS to the above Hydra settings!

4.1.3 Boot agent settings

For the single board computer SBC/2 it is important that the boot agent uses correct settings to prevent it to try to boot from the network, which would increase startup time of the HYDRA. These settings are pre-configured in your HYDRA. In case they have been changed, please use the table below as a reference to readjust the settings.

The settings of the boot agent of the SBC/2

path	setting
Network Boot Protocol	PXE
Boot Order	Int 18h
Show Config Message	Enable
Show Message Time	3 Seconds

Table 4-4
Realtek boot agent settings

After readjusting the settings, press the **F4** key to save the changes and quit.

4.1.4 Finishing the setup of BIOS and boot agent

- After selecting the appropriate settings save the settings and exit the BIOS or boot agent setup.
- Halt the HYDRA and switch it off again, see above.
- Now you can safely disconnect monitor and keyboard from the SBC.
- The HYDRA can be taken into its usual operation again.

4.2 Additional video related input

The HYDRA is able to detect and display further video related information. This is in particular closed caption (CC), extended data structure (XDS), vertical interval time code (VITC), wide screen signaling (WSS) and video index information coding (VLI), both with an option of the active format descriptor (AFD) and embedded audio. Furthermore tallies and LTC can be processed.

4.2.1 Capability of the input cards

The above mentioned detection of video related information is not supported in the same way by all of the input boards. Please see in the table below the abilities of the video input cards.

Property	Dual SDI input card	Quad SDI input card	HD-SDI input card	Dual analog video input card	Quad analog video input card	overlay input card
CC	NTSC only	NTSC only	-	NTSC only	NTSC only	-
XDS	NTSC only	NTSC only	-	NTSC only	NTSC only	-
VITC	OK	OK	-	OK	OK	OK
LTC	-	-	-	-	-	OK
WSS	PAL only	PAL only	-	OK	OK	-
WSS - AFD option	PAL only	PAL only	-	-	-	-
VLI	PAL only	PAL only	-	-	-	-
VLI - AFD option	PAL only	PAL only	-	-	-	-
embedded audio	OK	OK	OK	-	-	-
hardware tallies	3 / source	2 / source	3 / source	3 / source	2 / source	-

Table 4-5
relation of video properties

The RGB input card and Streaming video card does not support any of the above mentioned properties.

4.3 Redundant operation

If operating two or more HYDRAS, special hard- and software configurations can be made to avoid a loss of source control in case that one display fails. Depending on the used output cards and the selection of the format of the output data different configurations must be applied.

By using special layouts which complement one another, when being displayed on top of each other, all sources and further information of both HYDRA units can be displayed on one projection module, but of course with less available space per source. Please refer to the iSTUDIO user's manual, section Redundant Operation.

DVI output with DVI-video output card

With the DVI-video output card two cases have to be distinguished. If it is the DVI connector that connects to the projection modules then two output cards per HYDRA have to be used to establish a redundant setup. The DVI connector of the first output card is connected to the projection module to provide the digital or analog data; the DVI connector of the second output card is connected to the overlay input card of another HYDRA. In addition the video output of both output cards can be connected to suitable devices.

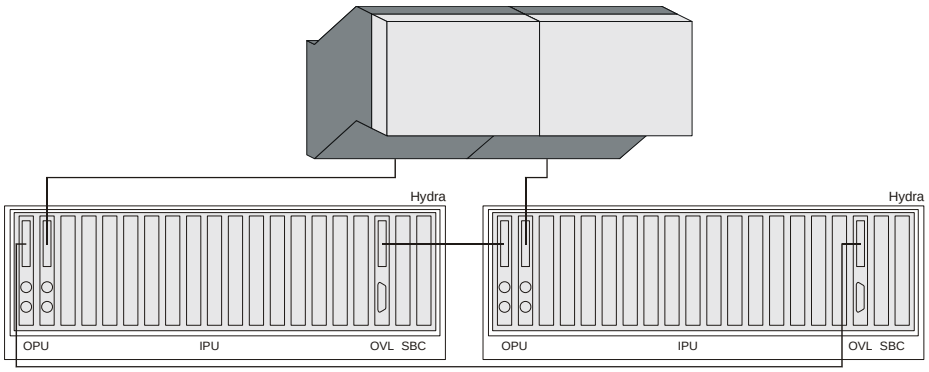


Figure 4-1
Hardware configuration for redundant operation with DVI-video output card in DVI output mode with two output cards per unit

Video output with DVI-video output card

If the DVI-video output card provides a video timing, then one output card per HYDRA is sufficient to setup a redundant system. The suitable BNC connector (SDI or CVBS) of the output card remains connected to the displaying device, whereas the DVI connector is used to connect to the overlay input card of the other HYDRA and vice versa.

If this configuration is used, a DVI timing should be selected.

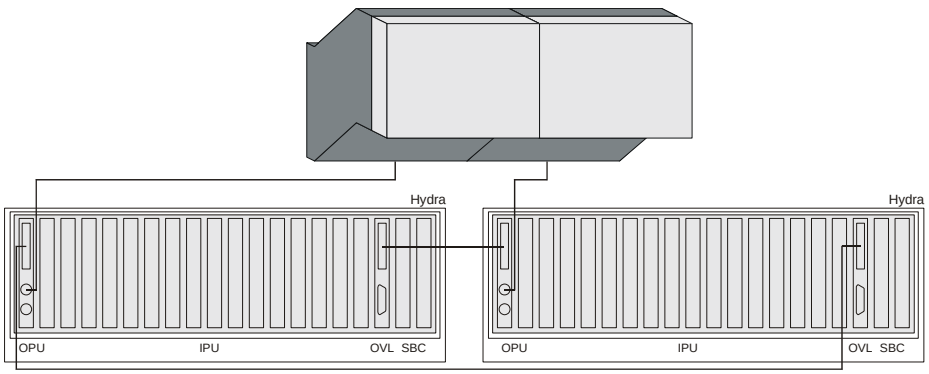


Figure 4-2
Hardware configuration for redundant operation with DVI-video output card in video output mode with one output card per unit

Analog or digital Output with DVI-DVI Output Card

If the HYDRA is equipped with DVI-DVI output cards, one output card per HYDRA is sufficient. The upper connector [1] on the output card is used to connect to the projection module; the lower one [2] is used to connect to the overlay input card of another HYDRA and vice versa.

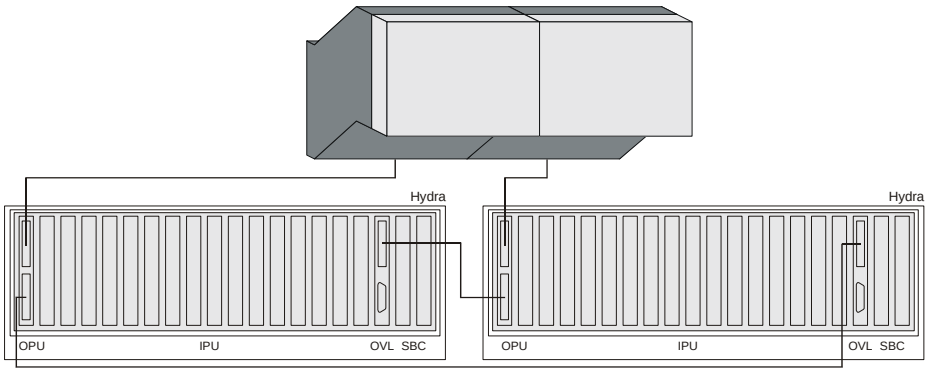


Figure 4-3
Hardware configuration for redundant operation with DVI-DVI output card with one output card per unit

4.4 Dual mode

In **dual mode** one HYDRA is connected to two projection modules. A special setting of the iSTUDIO software allows displaying the sources of the HYDRA on both modules; please refer also to the iSTUDIO user's manual, section Dual Mode. If using a DVI-DVI output card, one card per HYDRA is sufficient to setup dual mode. If using a DVI-video output card a second additional output card of the same type is required for dual mode.

DVI-video output card

Two output cards are required. Each output card is connected to one projection module. The first output card (the one which is next to the input cards) must be connected to the left projection module; the second output card must be connected to the right projection module. Dual mode can be established via the DVI connectors or the BNC connectors. The figure below demonstrates the cabling in dual mode:

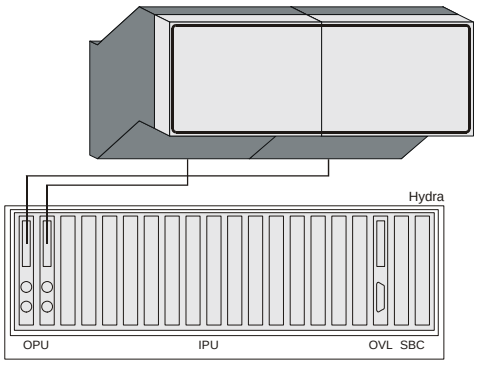


Figure 4-4
Dual mode connection for two DVI-video output cards

DVI-DVI output card (digital or digital/analog)

With a DVI-DVI output card in dual mode each connector of the card is used to provide data for one projection module. Channel one (the upper connector) is connected to the left projection module (looking from front to the projection modules); channel two is connected to the right projection module, please see also the figure below:

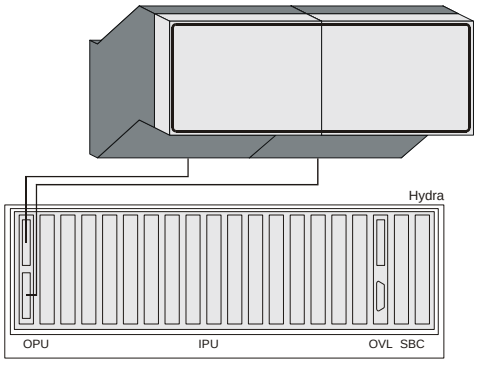


Figure 4-5
Scheme of dual mode connection for a DVI-DVI output card

5 Maintenance

The HYDRA requires very little maintenance. Some maintenance operations are nevertheless necessary to maintain distortion free operation of the HYDRA.

5.1 Exchange of consumables

5.1.1 Replacing the filter pad of Hydra

The filter pad of the HYDRA case has to be changed in intervals, depending on the grade of pollution of the air.

The air filter is located behind the ventilation slits on the front of HYDRA.

- Unlock the front cover of HYDRA with the key!
- Open the filter flap upwardly!
- On the inner side of the filter flap there is a securing screw, which holds a steel plate and the filter. Loosen this screw!
- Now you can remove the steel plate and the filter pad from the filter flap. Remove the old filter pad from the steel plate and put a fresh one on it!
- Place the steel plate on its location on the filter flap and tighten the securing screw!
- Close the filter flap!
- Lock the front cover!

5.2 Cleaning

To keep the cabinet looking brand-new, periodically clean it with a soft cloth. Stubborn stains may be removed with a cloth lightly dampened with mild detergent solution. Never use strong solvents, such as thinner or benzine, or abrasive cleaners, since these will damage the cabinet.

Unplug the device from the wall outlet before cleaning.

Never clean the case of HYDRA without first disconnecting the power supply cords!

Do not use liquid cleaners or aerosol cleaners!

6 Technical appendix

This chapter provides tabular overview about the technical details of HYDRA, its components and of their interfaces.

6.1 Technical data

Hydra

dimensions (h/w/d)	267 mm/435 mm/562 mm | 10.5 in. (6U)/19.0 in./22 in.
dimensions (h/w/d) with fixation, handling	267 mm/482 mm/597 mm
weight	31.5 kg | 69.4 lbs.
AC power supply	100 .. 240 V
mains frequency	50/60 Hz
power consumption	620 W
inrush current (264 V)	94 A
operating conditions	0 .. 40° Celsius at 8 .. 80% humidity, non condensing

Table 6-1
HYDRA – technical data

HD-SDI video input card

socket	
HD-SDI input	input for HD-SDI video signal: BNC signal: SMPTE 292M compliant
HD-SDI output	input for HD-SDI video signal loopthrough: BNC signal: SMPTE 292M compliant
GPIO	RJ45 connector internal pull up resistor of 10k output signal: logic high: min 4.5V logic low: max 0.5V input signal: logic high: high impedance logic low: max 0.7V

resolution	**FORMAT**	**LINES**	**WORDS**	**FRAME RATE**	**FIELDS**
	A	1035	1920	30	I
	B	1035	1920	30/1.001	I
	C	1080	1920	25	I
	D	1080	1920	30	I
	E	1080	1920	30/1.001	I
	F	1080	1920	25	I
	G	1080	1920	30	P
	H	1080	1920	30/1.001	P
	I	1080	1920	25	P
	J	1080	1920	24	P
	K	1080	1920	24/1.001	P
	L	720	1280	60	P
	M	720	1280	60/1.001	P

Table 6-2
HD-SDI video input card – technical data

Quad analog video input card

socket	
composite video input	input for composite video signal: BNC signal: max 1.0 V_{pp}; 75 Ω terminator
GPIO	RJ45 connector 10-pins internal pull up resistor of 10k output signal: logic high: min 4.5 V logic low: max 0.5 V input signal: logic high: high impedance logic low: max 0.7 V
video timings	PAL BDGHI NTSC M, Japan SECAM NTSC 4.43 PAL M PAL N

Table 6-3
Quad analog video input card – technical data

Quad SDI video input card

socket	
SDI input	input for SDI video signal: BNC signal: SMPTE 259M-C (270Mbps, 4:2:2) compliant
GPIO	RJ45 connector 10-pins internal pull up resistor of 10k output signal: logic high: min 4.5V logic low: max 0.5V input signal: logic high: high impedance logic low: max 0.7V
video timings	NTSC 4:2:2 component 13.5MHz Y sampling PAL 4:2:2 component 13.5MHz Y sampling

Table 6-4
Quad SDI video input card – technical data

Streaming video card

socket	2 × RJ45 connector 8-pin for redundant connection	
video formats	PAL, NTSC	
compression algorithm	MPEG-1	ISO 11172
	MPEG-2	ISO 13818 (MP@ML 4:2:0)
	DVB	ETR 154 / SPTS / MPTS (the DVB format is MPEG-2 based)
	MPEG-4 part 2	ISO 14496-2 (SP@L3, ASP@L5)
	Bosch MPEG-4 (h263)	
	MJPEG	ISO 10918
	MXPEG	
	2D Wavelet	
bitrate	1 - 4 streams and max. 44Mbps per board	
	MPEG-1:	up to 4 streams (all resolutions)
	MPEG-2:	up to 4 D1 streams or 4 CIF streams, 44Mbps per board, max. 15Mbps per stream
	MPEG-4 part 2:	up to 4 CIF streams or 3 2CIF streams or 1-2 4CIF streams, depends on resolution 32Mbps per board, max. 8Mbps per stream
	MPEG-4 h263:	up to 4 CIF streams or 4 2CIF streams or 4 4CIF streams
	MJPEG:	up to 4 CIF streams or 2-4 4CIF streams
	Visiowave:	1-3 D1 streams or up to 4 CIF streams, depends on resolution
	TRANSFORM SCN:	1 stream
digital network carrier	Base–T Ethernet 10/100 Mbps	
network transmission protocol	UDP	
	RTP (variable header length, lost packet detection, packet recorder, non-video packet detection)	
connection protocols	IGMP v2 and v3 (multicast subscription)	
supported encoders	MPEG-2:	Bosch, Coretec, Cornet, Exterity, Fast Video Security, HaiVision, iMPath, Lanaccess, Mavix, NKF, Optibase, Path1, PelcoNET, Siemens OTN, Tandberg, Teleste, Telindus, VBrick, VideoLAN, Vorx
	MPEG-4 part 2:	Cornet, DVTeL, IndigoVision, Lanaccess, Mavix, NiceVision, Siemens OTN, Teleste, VBrick, Verint, VideoLAN, Vorx
	MPEG-4 h263:	Bosch, PelcoNET
	MJPEG:	AXIS, Lenel, VideoLAN
	MXPEG:	Mobotix
	2D Wavelet:	Visiowave
	TRANSFORM SCN:	Barco

Table 6-5
Streaming video card – technical data

RGB input card

socket	
RGB input	2×DVI-I FBS P29
horizontal frequency	15kHz – 90kHz
pixelclock	analog interface: 20MHz – 140MHz digital interface: 20MHz – 112MHz
resolution & colors (analog)	VGA 60Hz @ 24bpp – SXGA 75Hz @ 24bpp
sync modes	separate sync, composite sync, sync-on-green
resolution & colors (analog HD)	24 bpp, only progressive scan
720×483	(60/1.001) Hz
1280×720	(60/1.001) Hz, 60 Hz
1920×1080	(24/1.001) Hz, 24 Hz, (25/1.001) Hz, 25 Hz, (30/1.001) Hz, 30 Hz
sync modes	American Bi-level; American Tri-level
resolution & colors (digital)	with input signal along DVI specifications
640×480	60 Hz, 24 bpp
800×600	60 Hz, 24 bpp
1024×768	60 Hz, 24 bpp
1280×1024	60 Hz, 24 bpp

Table 6-6
RGB input card – technical data

Overlay input card OVL IPU/4

socket	
graphics input	DVI-I connector
genlock/LTC/VITC input	D15
timing	from VGA@60 Hz up to UXGA@60 Hz
pixelclock	25MHz up to 165MHz

Table 6-7
Overlay input card OVL IPU/4 – technical data

Output card DVI-video – 1 channel

digital output	DVI 1.0
analog output	RGB HsVs
SDI output	SMPTE259-M
CVBS output	CCIR601
socket	1 × DVI-I FBS P29 connector 2 × BNC FBS 75Ω connector
timing	Digital output: up to iStudio timing **Barco Projector PU UXGA 60Hz** Analog output: up to iStudio timing **Barco Projector PU UXGA 60Hz** SDI output: PAL (720×576) NTSC (720×487) CVBS output: PAL-B, D, G, H, I (702×575) NTSC/PAL-M (711×482)

Table 6-8
DVI-video output card – technical data

Output card DVI-DVI digital with scaling – 2 channel

digital output	DVI 1.0
socket	2 × DVI-I FBS P29 connector
timing	up to iStudio timing **Barco Projector PU UXGA 60Hz**

Table 6-9
Output card DVI-DVI digital with scaling – technical data

Output card DVI-DVI digital/analog – 2 channel

digital output	DVI 1.0
analog output	RGB HsVs
socket	2 × DVI-I FBS P29 connector
timing	Digital output: up to iStudio timing **Barco Projector PU UXGA 60Hz** Analog output: up to iStudio timing **Barco Projector PU UXGA 60Hz**

Table 6-10
Output card DVI-DVI digital/analog – technical data

Output card DVI-DVI digital – 2 channel

digital output	DVI 1.0
Socket	2 × DVI-I FBS P29 connector
Timing	up to iStudio timing **Barco Projector PU UXGA 60Hz**

Table 6-11
Output card DVI-DVI digital – technical data

Analog audio daughter board

Input	analog audio
input impedance	50kΩ
input sensitivity	0dBu
max. input level	24dBu
frequency reponse at –3dB points	from 15Hz to 23.2kHz
A/D converter	stereo 18 bit converter
smapling frequency	48 kHz per channel

Table 6-12
analog audio daughter board – technical data

Balanced digital audio daughter board

input	digital AES/EBU audio
input type	differential
input compatibility	RS422
input interface	transformerless professional
sampling frequency	32, 44.1, 48kHz detected via input

Table 6-13
balanced digital audio daughter board – technical data

Unbalanced digital audio daughter board

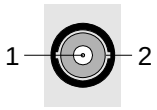
input	digital AES/EBU audio
input type	AES3-id 75Ω unbalanced
sampling frequency	32, 44.1, 48kHz detected via input

Table 6-14
unbalanced digital audio daughter board– technical data

6.2 Interfaces

Seen from outside of HYDRA.

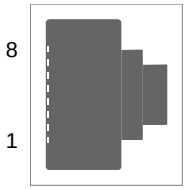
Quad analog video input card, Quad SDI video input card and HD-SDI video input card



1	Signal
2	Shield

Figure 6-1
BNC connector, Quad analog / Quad SDI / HD-SDI video input card – pin assignments

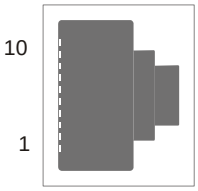
HD-SDI video input card – 8 pin RJ45 connector



1	GND	**5**	GPIO1 channel B
2	GPIO3 channel A	**6**	GPIO2 channel A
3	GPIO3 channel B	**7**	GPIO2 channel B
4	GPIO1 channel A	**8**	GND

Figure 6-2
Connector for GPIO insertion, HD-SDI video input card – pin assignment

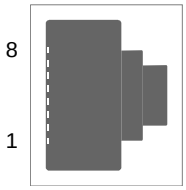
Quad analog video input card and Quad SDI video input card – 10 pin RJ45 connector



1	GND	**6**	GPIO2 channel A
2	GPIO2 channel D	**7**	GPIO2 channel B
3	GPIO1 channel D	**8**	GPIO1 channel A
4	GPIO2 channel C	**9**	GPIO1 channel B
5	GPIO1 channel C	**10**	GND

Figure 6-3
Connector for GPIO insertion, Quad analog / Quad SDI – pin assignment

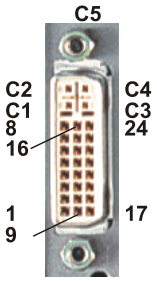
Streaming video card



1	TD+	**5**	
2	TD-	**6**	RD-
3	RD+	**7**	
4		**8**	

Figure 6-4
RJ-45 connector, Streaming video card – pin assignment

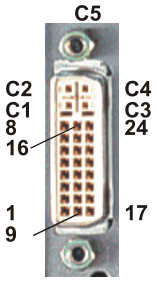
RGB input card



C2	Analog Green	**C5**	Analog Ground (analog R, G, & B return)	**C4**	Analog HSync
C1	Analog Red			**C3**	Analog Blue
8	Analog VSync	**16**	Hot Plug Detect	**24**	TMDS Clock-
7	DDC Data	**15**	Ground (return for +5V, Hsync, and Vsync)	**23**	TMDS Clock+
6	DDC Clock	**14**	+5V	**22**	TMDS Clock Shield
5	unused	**13**	unused	**21**	unused
4	unused	**12**	unused	**20**	unused
3	TMDS Data2 shield	**11**	TMDS Data1 shield	**19**	TMDS Data0 shield
2	TMDS Data2+	**10**	TMDS Data1+	**18**	TMDS Data0+
1	TMDS Data2-	**9**	TMDS Data1-	**17**	TMDS Data0-

Figure 6-5
DVI-I connector, RGB input card – pin assignment

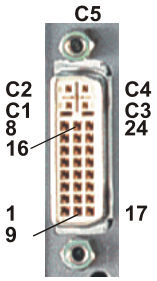
DVI-DVI digital output card and DVI-DVI digital output card with scaling



C2	not connected	**C5**	ground	**C4**	not connected
C1	not connected			**C3**	not connected
8	not connected	**16**	hot plug detect	**24**	TMDS clock-
7	DDC serial data	**15**	ground	**23**	TMDS clock+
6	DDC serial clock	**14**	+ 5V power	**22**	TMDS clock shield
5	not connected	**13**	not connected	**21**	not connected
4	not connected	**12**	not connected	**20**	not connected
3	TMDS data2 shield	**11**	TMDS data1 shield	**19**	TMDS data0 shield
2	TMDS data2+	**10**	TMDS data1+	**18**	TMDS data0+
1	TMDS data2-	**9**	TMDS data1-	**17**	TMDS data0-

Figure 6-6
DVI-I connector, DVI-DVI digital output card with/without scaling – pin assignment

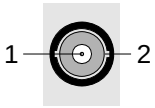
DVI-DVI digital/analog output card, DVI-video output card – DVI-I connector



C2	green	**C5**	ground	**C4**	HSync
C1	red			**C3**	blue
8	Vsync *1	**16**	hot plug detect	**24**	TMDS clock-
7	DDC serial data	**15**	ground	**23**	TMDS clock+
6	DDC serial clock	**14**	+ 5V power	**22**	TMDS clock shield
5	not connected	**13**	not connected	**21**	not connected
4	not connected	**12**	not connected	**20**	not connected
3	TMDS data2 shield	**11**	TMDS data1 shield	**19**	TMDS data0 shield
2	TMDS data2+	**10**	TMDS data1+	**18**	TMDS data0+
1	TMDS data2-	**9**	TMDS data1-	**17**	TMDS data0-

Figure 6-7
DVI-I connector, DVI-DVI digital/analog output card and DVI-video output card – pin assignment

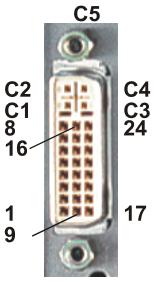
DVI-video output card – BNC connector



1	Signal	**2**	Shield

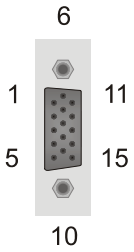
Figure 6-8
BNC connector, DVI-video output card – pin assignments

Overlay input card OVL IPU/4



C2	unused	**C5**	ground	**C4**	unused
C1	unused			**C3**	unused
8	unused	**16**	hot plug detect	**24**	TMDS clock-
7	DDC serial data	**15**	ground	**23**	TMDS clock+
6	DDC serial clock	**14**	+ 5V power	**22**	TMDS clock shield
5	unused	**13**	unused	**21**	unused
4	unused	**12**	unused	**20**	unused
3	TMDS data2 shield	**11**	TMDS data1 shield	**19**	TMDS data shield
2	TMDS data2+	**10**	TMDS data1+	**18**	TMDS data0+
1	TMDS data2-	**9**	TMDS data1-	**17**	TMDS data0-

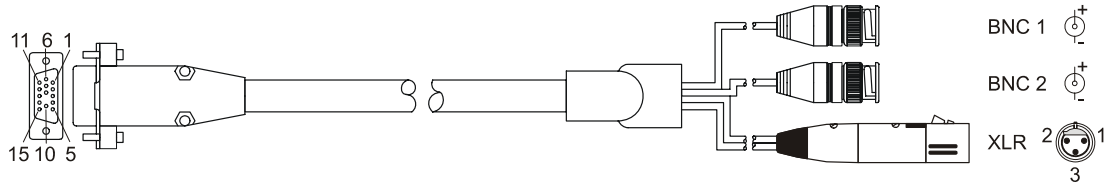
Figure 6-9
DVI-I FBS P29 connector, overlay input card OVL IPU/4 – pin assignment



1	Genlock input (PAL or NTSC)	**6**	ground	**11**	unused
2	VITC input	**7**	ground	**12**	unused
3	unused	**8**	ground	**13**	LTC+ input
4	unused	**9**	unused	**14**	LTC- input
5	unused	**10**	ground	**15**	unused

Figure 6-10
Sub D15 connector, overlay input card OVL IPU/4 – pin assignment

Breakout cable for overlay input card OVL IPU/4



HD15P			BNC
1	**red wire**	BNC 1 +	genlock (PAL or NTSC)
6		BNC 1 -	shield
2	**green wire**	BNC 2 +	VITC (PAL or NTSC)
7		BNC 2 -	shield
13	**grey wire**	XLR 2	LTC high
10		XLR 1	shield
14	**black wire**	XLR 3	LTC low
11		XLR 1	shield

Figure 6-11
Breakout Cable for overlay input card OVL IPU/4 – pin assignment

Analog audio daughter board

1	GND	**35**	GND
2	GND	**36**	GND
3	AINL+0	**37**	AINL-0
4	AINR+0	**38**	AINR-0
5	AINL+1	**39**	AINL-1
6	AINR+1	**40**	AINR-1
7	AINL+2	**41**	AINL-2
8	AINR+2	**42**	AINR-2
9	AINL+3	**43**	AINL-3
10	AINR+3	**44**	AINR-3
11	AINL+4	**45**	AINL-4
12	AINR+4	**46**	AINR-4
13	AINL+5	**47**	AINL-5
14	AINR+5	**48**	AINR-5
15	AINL+6	**49**	AINL-6
16	AINR+6	**50**	AINR-6
17	GND	**51**	GND
18	GND	**52**	GND
19	AINL+7	**53**	AINL-7
20	AINR+7	**54**	AINR-7
21	AINL+8	**55**	AINL-8
22	AINR+8	**56**	AINR-8
23	AINL+9	**57**	AINL-9
24	AINR+9	**58**	AINR-9
25	AINL+10	**59**	AINL-10
26	AINR+10	**60**	AINR-10
27	AINL+11	**61**	AINL-11
28	AINR+11	**62**	AINR-11
29	AINL+12	**63**	AINL-12
30	AINR+12	**64**	AINR-12
31	AINL+13	**65**	AINL-13
32	AINR+13	**66**	AINR-13
33	GND	**67**	GND
34	GND	**68**	GND

Figure 6-12
SCSI4 female connector, analog audio daughter board – pin assignment

Digital audio daughter board

1	GND	**35**	GND
2	GND	**36**	GND
3	DIN+0	**37**	DIN-0
4	not connected	**38**	not connected
5	DIN+1	**39**	DIN-1
6	not connected	**40**	not connected
7	DIN+2	**41**	DIN-2
8	not connected	**42**	not connected
9	DIN+3	**43**	DIN-3
10	not connected	**44**	not connected
11	DIN+4	**45**	DIN-4
12	not connected	**46**	not connected
13	DIN+5	**47**	DIN-5
14	not connected	**48**	not connected
15	DIN+6	**49**	DIN-6
16	not connected	**50**	not connected
17	GND	**51**	GND
18	GND	**52**	GND
19	DIN+7	**53**	DIN-7
20	not connected	**54**	not connected
21	DIN+8	**55**	DIN-8
22	not connected	**56**	not connected
23	DIN+9	**57**	DIN-9
24	not connected	**58**	not connected
25	DIN+10	**59**	DIN-10
26	not connected	**60**	not connected
27	DIN+11	**61**	DIN-11
28	not connected	**62**	not connected
29	DIN+12	**63**	DIN-12
30	not connected	**64**	not connected
31	DIN+13	**65**	DIN-13
32	not connected	**66**	not connected
33	GND	**67**	GND
34	GND	**68**	GND

Figure 6-13
SCSI4 female connector, digital audio daughter board – pin assignment

Analog EDAC connector on Parthenope

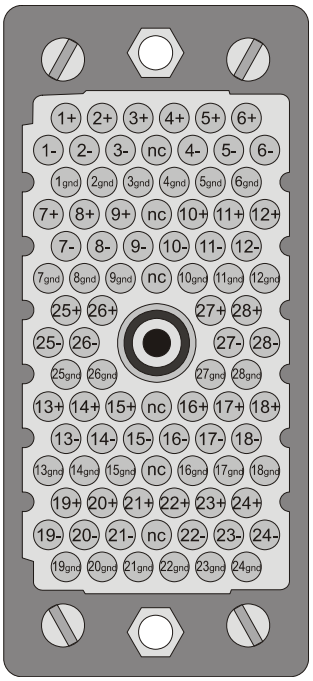


Figure 6-14
Analog EDAC connector – pin assignment

Digital EDAC connector on Parthenope

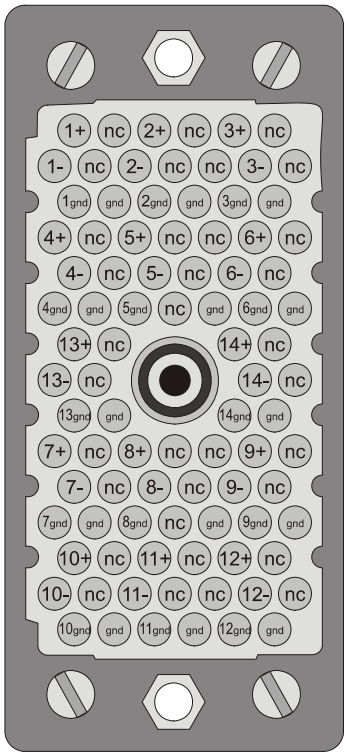

1+ nc 2+ nc 3+ nc
1- nc 2- nc nc 3- nc
1gnd gnd 2gnd gnd 3gnd gnd
4+ nc 5+ nc nc 6+ nc
4- nc 5- nc 6- nc
4gnd gnd 5gnd nc gnd 6gnd gnd
13+ nc 14+ nc
13- nc 14- nc
13gnd gnd 14gnd gnd
7+ nc 8+ nc nc 9+ nc
7- nc 8- nc 9- nc
7gnd gnd 8gnd nc gnd 9gnd gnd
10+ nc 11+ nc 12+ nc
10- nc 11- nc nc 12- nc
10gnd gnd 11gnd gnd 12gnd gnd

Figure 6-15
Digital EDAC connector – pin assignment

6.3 Order codes

Hardware	
R5976260	user's manual HYDRA, English
R5976569	user's manual iSTUDIO, English
R5976593	iSTUDIO – Manuals & Supplement, CD-ROM
R9830966	HYDRA base unit
R0PT1913	Quad SDI video input card for HYDRA
R0PT1867	HD-SDI video input card for HYDRA
R0PT1933	Quad analog video input card for HYDRA
R0PT1951	Streaming video card for HYDRA
R0PT1851	RGB DVI input card for HYDRA
R0PT2059	DVI-DVI digital output card with scaling for HYDRA
R0PT1958	DVI-DVI digital/analog output card for HYDRA
R0PT1959	DVI-DVI digital output card for HYDRA
R0PT2022	DVI-video output card for HYDRA
R0PT1766	audio input card for HYDRA, mother board
R0PT1767	audio input card for HYDRA, analog daughter board
R0PT1768	audio input card for HYDRA, digital daughter board balanced
R0PT1914	audio input card for HYDRA, digital daughter board unbalanced
R9830975	PARTHENOPE, Audio BreakOut box, 56 channel
R9830970	PARTHENOPE, Audio BreakOut box, 112 channel
R9830990	connector EDAC 90 male
R9830985	patch panel 15×2 BNC
R9830980	flight case for HYDRA
R0PT1771	cable set (D15 – BNC, 5 × BNC, RGB 15 m)
R0PT1960	cable set (DVI – 5×BNC)
B5580602	VGA – DVI-A cable, 2m
Hardware spareparts	
R9851720	spare Quad SDI video input card for HYDRA
R9830995	spare HD-SDI video input card for HYDRA
R9851770	spare Quad analog video input card for HYDRA
R9842320	spare Streaming video card for HYDRA
R9830961	spare RGB DVI input card for HYDRA
R9832460	spare audio input card for HYDRA, mother board
R9832470	spare audio input card for HYDRA, analog daughter board
R9832480	spare audio input card for HYDRA, digital daughter board balanced
R9851730	spare audio input card for HYDRA, digital daughter board unbalanced
R9830968	spare DVI-DVI digital output card with scaling for HYDRA
R9842290	spare DVI-DVI digital/analog output card for HYDRA
R9842280	spare DVI-DVI digital output card for HYDRA
R9842520	spare DVI-video output card for HYDRA
R9851790	spare overlay input card OVL IPU/4
R98518001	spare single board computer /2
R9832530	spare CD-ROM drive
R9832560	spare backplane
R9832450	spare case
R98324401	spare flash disk 256MB
R9832490	spare SCSI-4 cable
R9832520	spare power supply 800W for HYDRA
R9832510	spare fan

Software/Licenses	
R32875211	spare software medium, iSTUDIO – Hydra boot CD
ROPT1934	iSTUDIO software license per HYDRA unit
ROPT1935	license for embedded audio metering per input channel

Table 6-15
Order codes

7 Troubleshooting

Check this chapter for help, if your HYDRA does not operate properly and for information how to contact the technical support of Barco.

7.1 Hydra does not start up

If HYDRA does not start up, check the power cables at the back side of HYDRA. Check also if the power modules are activated with the individual switches [43] at the back. When you hear no buzzer alarm and all green LEDs [42] of the power modules at the back are activated, place the iSTUDIO – Hydra boot CD in the drive [7] and restart if necessary.

7.2 Hotline

Feel free to contact us if you have any further questions!

- **Barco N.V. Projection Systems Belgium**
  Noordlaan 5, B-8520 Kuurne
  Phone: +32-56-368-211, Fax: +32-56-368-251
  E-mail: support.bcd@barco.com, Web: www.barcocontrolrooms.com

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